

Orient Bridge
On Richardson Road, spanning the Kettle River
Orient
Ferry and Stevens counties
Washington

HAER No. WA-32

HAER,
WASH,
10-ORI,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Western Regional Office
National Park Service
U.S. Department of the Interior
San Francisco, California 94102

HISTORIC AMERICAN ENGINEERING RECORD

HAER
WASH,
10-ORI,
1-

Orient Bridge

HAER No. WA-32

Location: On Richardson Road, spanning the Kettle River, ca. .3 mile east of U.S. Highway No. 395, connecting Ferry and Stevens counties, Washington

UTM: 11:412160.5413080
Quad: Orient

Date of Construction: 1909

Builder/Contractor: The C. G. Sheely Contracting Company, Denver, Colorado

Present Owner: Stevens and Ferry counties

Present Use: Vehicular bridge - Replacement 1992

Significance: The 180-foot-long, steel Parker truss Orient Bridge is one of only five bridges of this type built before 1910 remaining in Washington State. The arched top chord of the Parker truss design (a variation of the Pratt truss) increased structural rigidity. This innovation enabled construction of longer spans than was possible with other pin-connected bridge designs of the early twentieth century. The Orient Bridge is significant locally for the role it played in the transportation network of Ferry and Stevens counties, Washington, and for its importance in facilitating movement of mineral and timber resources to nearby refining and production centers. The Orient Bridge was listed in the National Register of Historic Places in 1982.

Historian: Rohin Bruce
Archaeological and Historical Services
Eastern Washington University
Cheney, Washington

Date: April 1992

INTRODUCTION

The Orient Bridge crosses the Kettle River at the eastern city limits of Orient, Washington, an unincorporated town located in northeastern Ferry County, Washington. That community lies within the Kettle River and Pierce Lake Mining districts. Founded in the first decade of the twentieth century, Orient served the mining trade until the decline of that industry in the 1930s. In succeeding years, lumbering has replaced mining as the principal enterprise in the area. However, the town of Orient is today utilized mainly as a retirement community (*Spokesman Review* 17 June 1991). Orient is located ca. 10 miles south of the boundary between the United States and Canada. The Orient Bridge connects Ferry and Stevens counties, Washington, and is co-owned by those counties.

SITE DESCRIPTION AND LAYOUT

The town of Orient is situated in Ferry County, Washington, immediately west of the Kettle River, in the Selkirk Range of the Rocky Mountains. The town occupies an open terrace formed where the Kettle River makes a broad loop between North Boulder Ridge and Jasper Mountain to the west and Toulou and First Thought mountains located in Stevens County immediately to the east. The Orient Bridge connects the vast timber and mineral lands of the Colville National Forest to the east with U.S. Highway 395 located ca. .3 mile west of the bridge. U. S. Highway 395 is a major north/south link in the Kettle River Valley and United States and Canada transportation network. The Burlington Northern Railroad (BN) passes along the western limits of the town of Orient adjacent to (east of) U. S. Highway 395.

The setting of the Orient Bridge is rugged (see photograph WA-32-1), much in keeping with the character of the extractive industries that historically have played the central role in the economy of the area. The Kettle River is swift flowing and deep, conditions which have long posed challenges for bridge crossings at Orient (see Historical Background section of this report). Donaldson and DeFrancesco describe the physiography of the Kettle River Valley as follows:

The Kettle River Valley enters the United States at the northwestern corner of Stevens County and follows a general southerly direction for about 27 miles. It joins the Columbia River near Marcus. The Kettle River is narrow and deep, and the water flows swiftly. Terraces range from 1/4 mile to 1 1/2 miles in width and are not so high above the river as the terraces above the Columbia and Spokane River Valleys. Within a few miles of the river, the mountains rise abruptly to an elevation of 4,000 to 5,000 feet (Donaldson and DeFrancesco 1982:2).

At the Orient Bridge, the banks of the river are steep and relatively high, with the bridge deck elevated ca. 30 feet above the river's surface. The straight west alignment of the bridge is formed by Orient's Main Street which descends a long gentle slope to the bridge's west portal (see photograph WA-32-6). The northern rockbound flank of Toulou Mountain rises abruptly above the road bed at the bridge's east end. The bridge's difficult eastern alignment is formed where the bridge forms a "T" with Richardson Road. Toulou Mountain rises abruptly above the road, creating 90° turnarounds from the bridge onto Richardson Road to the north and to the south (see photograph WA-32-2). Ponderosa pine, fir, and tamarack are the most common coniferous trees near the bridge, with deciduous cottonwood and willow common along the river's shoreline. Native grasses, wild rose, syringa, and other native shrubbery flank either side of the river bank on the bridge's eastern approach. The riverine environment near the bridge provides habitat for chipmunks, porcupines, skunks and other small mammals that are native to the area.

The numerous dilapidated and vacant buildings in Orient attest to an earlier, more prosperous period in the town's history, and today contribute to the quaintness of the setting. The town of Orient presently consists of a few commercial businesses, mostly located along Main Street, with the U.S. Post Office located in a private dwelling along that street. The town includes a school (constructed 1910) that is still in use and scattered residential dwellings, mostly dating to the early 1900s. In recent years, a number of mobile homes have also been placed on lots in Orient as well as on small acreages near the community.

A small cultivated flat (ca. 20 acres) is located ca. .25 mile upstream (north of) the Orient Bridge on the river's east bank. South of the bridge on the river's east side, the crest of the river bank forms the west boundary of the gravel roadway, with the road's east boundary paralleling the base of the mountain. On the west bank of the river, a fenced pasture of ca. 15 acres is situated downstream from (south of) the bridge on a low terrace above the river, while upstream from (north of) the bridge domestic dwellings occupy the river bank. Residences that occupy the platted townsite of Orient stand on either side of the bridge's west approach. Immediately north of the bridge's west abutment, a well-traveled foot path, apparently worn by local youngsters and fisherman, descends the steep bank to the river. The trail further adds to the rustic character of the setting. In the river channel, immediately upstream from (north of) the Orient bridge, stands a small concrete pad, reportedly the remains of a former ferry cable crossing (Lakin 1987:175). The bridge crossing is characterized by low traffic flow (less than 400 vehicles per day) and a restricted speed zone of 25 mph (Stevens County "Description of Proposed Project" n.d.).

DESCRIPTION OF STRUCTURE

The Orient Bridge is a ten span 180 foot long steel, pin-connected through Parker truss (see photocopies of original Orient Bridge plans, photographs WA-32-12 through WA-32-15). The

height of the truss is 27 feet, with a portal clearance of 14 feet, 6 inches. The width of each panel is 18 feet. The bridge's narrow roadway measures 15 feet x 7 inches, and can accommodate one-way traffic only. Each truss approach (east and west ends) is composed of a steel girder span with corrugated metal decking and asphalt surface. The west approach is 40 feet long and the east approach is 20 feet in length. The bridge's upper chords vary in length from 18 to 28 feet. The vertical posts are finished with 2 1/2 inch double metal lacing. They are secured with grip pins to the upper and lower chords at the panel points (see photograph of original plans, WA-32-14). Diagonal members are composed of 2 x 3/4 inch steel rods (see photograph WA-32-10). Floor supports consist of 18 inch steel I-beams. Decking is composed of 4 x 12 inch flooring, with eleven lines of 4 x 12 inch floor joists (see photograph Wa-32-8). The wooden guard rails consist of 2 x 8 inch lumber, cut in 18 foot lengths (see photograph WA-32-10). From east to west the substructure consists of a timber bulkhead, one timber bent, one concrete pier, one concrete pile bent, and a concrete bulkhead (Stevens County, "Survey of County Bridges on the Kettle River," 18 July 1963:n.p.). The bridge rests on four original concrete-filled 48 inch steel tubular piers (see photograph WA-32-5).

ALTERATIONS TO THE ORIENT BRIDGE

Since its construction in 1909, the Orient Bridge has undergone few alterations. The most significant change occurred in 1959, when the original 32 foot long pile approach on the bridge's west end and the 32 foot long wood frame bent approach on its east end were replaced. The west approach was rebuilt with steel beams and steel bridge decking and the east approach was reconstructed with wood joists and wood decking. Ferry and Stevens counties shared in the rehabilitation effort. Ferry County contributed \$3,916.42 to the project, and Stevens County contributed \$8,764.43, for a total cost--including lumber, hardware, paint, and labor--of \$12,680.85 (Stevens County, "Bridge Repair," September 1959:n.p.). In addition to reconstruction of the east and west approaches, further work consisted of the following:

- (1) Dismantling, removing and disposing of the existing floor joist system, floor, and [g]uard rail
- (2) Placing 2" x 6" nailing strips on top of the 15" I-Beams
- (3) " 4" x 12" floor joists
- (4) " 4" x 12" flooring
- (5) Constructing guard rail complete

- (6) Placing two metal tread strips, each 3/16" x 36" across entire bridge (except the west 40')
- (7) Scraping and painting all metal in the 180' truss, and the four tubular piers
- (8) Painting guard rail (Stevens County, "Orient Bridge Repair", 1959:n.p.).

In 1965 the bridge's wooden east approach was removed and rebuilt with steel and concrete. Two concrete wing walls were installed on the west approach at that time. Cost of the project included \$2,476.54 (labor), \$2,432.51 (material), and \$554.20 (equipment rental), for a total cost of \$5,463.25 (Stevens County, "Bridge Repair," September 1965:n.p.) The most recent renovation occurred in 1986 when all bent members of the truss were heat straightened ("Structural Report for the Orient Bridge" 1986:n.p.).

PRESENT CONDITION OF THE ORIENT BRIDGE

The Orient Bridge and its approaches are in generally good condition. While some rust is present, there are no obvious signs of corrosion. The wooden stringers and decking installed in 1959 show no visible signs of deterioration. Although the bridge is structurally sound, its load carrying capacity is limited. The structure is currently rated for H-9 and HS-9 loading, which equates to a maximum allowable truck weight of nine tons (Stevens County, "Structural Report for the Orient Bridge," n.d.). Because of the bridge's narrow width and limited load carrying capacity, logging trucks and other commercial and private heavy carriers can not use the Orient Bridge.

ENGINEERING SIGNIFICANCE OF THE BRIDGE

The Orient Bridge is a pin-connected, Parker truss, a variation of the Pratt truss design of bridge architecture. Patented in 1844 by American designers Thomas and Caleb Pratt, the bridge type that bears their surname represented perhaps the most common type of truss bridge constructed in the U.S. during the early twentieth century (Comp and Jackson 1977:np). The Pratt truss represented a reversal of earlier design techniques, including the popular Howe truss design, in which the vertical members acted in tension, and the diagonals in compression. The Pratt truss featured the vertical members in compression and the diagonals acting in tension, (see photograph WA-32-10), with the diagonals sloping up and away from either side of the bridge center (see photograph WA-32-2). The Pratt truss design reduced the length of the compression members, an innovation that helped prevent bending or buckling of those parts. The Parker truss retains the Pratt configuration of compression and tension members, while alternating the shape of the top chord. The Parker truss features a polygonal top chord (see photograph WA-32-3), as contrasted with the straight top chord of the conventional Pratt truss. The arched top

chord of the Parker truss created a stronger structure than the conventional straight top chord design of the Pratt truss (Comp and Jackson 1977:np).

With the introduction of pin connections in the 1860s, the Pratt truss and variations of that design could easily be assembled in the field by unskilled laborers (Gies 1963:219-220). That bridge type's simple design and its ease of assembly lent itself particularly well to bridge building in the West, where skilled labor often was at a premium.

The Orient Bridge was listed in the National Register of Places (NRHP) in 1982. It is one of the last remaining and least altered pin-connected Parker truss bridges in Washington State, and it is the only bridge of that type with its original piers completely intact (Soderberg 1979:n.p.)

HISTORIC CONTEXT

The development of the rich mineral resources of northeastern Washington's Kettle River Valley, and the resultant transportation network that evolved, led to the founding of the town of Orient in 1902, and eventually to the construction of the present Orient Bridge in 1909 (Ferry County various dates:53). The Kettle River forms the eastern boundary of Ferry County and the western boundary of Stevens County. The abundant mineral wealth of those counties contributed to the early economic development of the bi-county region. In 1899 a Stevens County newspaper described the mineral wealth of that county and the importance of the mining industry to the county and to the region:

While the resources of Stevens County are as diversified as in most entire commonwealths, it is in the marvelous richness, variety and abundance of the mineral deposits which lie hidden in its hills awaiting but the helping hand of capital to bring untold wealth into the lap of the lucky investor, where lie its greatest possibilities and future prosperity (*Statesman-Index*, 25 December 1899:n.p.).

"Lucky investor[s]" included eastern capitalists who searched for gold, copper, silver, lead, marble, onyx, alabaster, lime and roofing slate that comprised the mineral and metamorphic rock wealth of the area. In addition to the "sound of the pick of the hardy prospector," outside investors quickly developed labor- and capital-intensive mining operations that extracted and refined mineral resources at their source (*Statesman-Examiner* 25 December 1899:n.p.).

In 1896 the Colville Indian Reservation (of which the future townsite of Orient was then a part) was opened to mineral entry. In April of that same year prospector Henry (Hank) Gibbons and three partners filed a claim for the Never Tell Mine in the Stevens County Courthouse. The claim was located approximately one mile southeast of the present town of Orient on mineral-

rich Toulou Mountain. Two years later, Gibbons, then apparently the mine's sole owner, sold the claim to A. B. and Willis Townsend. The Townsend brothers renamed Gibbon's mine the Orient Mine, reportedly in honor of industrious Chinese placer miners who had worked the Kettle River banks for gold in previous decades. The Townsend brothers also recruited eastern capital, wealth which financed the formation of the Orient Mine and Milling Company (Lakin 1987:142-143).

In 1901 news reached the Kettle River Valley that the Washington and Great Northern Railroad (GN) had selected the west bank of the Kettle River for its route. A group of local entrepreneurs selected the site of present-day Orient as a likely trading point on the GN line. They secured the future townsite from T.A. Ireland, whose eighty acre homestead encompassed the town site (Lakin 1987:143).

By the time the first GN train arrived in Orient in 1902, the town of Orient and the Orient Mining District were thriving. The previous year, Ferry County constructed the first bridge over the Kettle River at Orient. The handsome wooden bridge was the only free wagon bridge across the Kettle River between Marcus, located ca. 14 miles south of Orient, and the Canadian border, located ca. 10 miles to the north. The Orient Bridge facilitated the movement of ore from the numerous mines that dotted the steep mountains above Orient to various links in the regional transportation network. The imposing three-span bridge measured 320 feet in length, and was constructed for a cost of \$2,500 (Lakin 1987:147). In May of 1902, however, high water swept the bridge from its piers, sending the bridge floating "majestically downstream" (Lakin 1987:147). Shortly afterward, in June of 1902, a free cable ferry replaced the bridge, a disappointing substitute for the short-lived wooden bridge. In 1903, a new 149-foot Howe truss bridge replaced the ferry. Capacity of that bridge was 540 tons (Lakin 1987:149).

Aided by the mining boom, by 1903 town lots were selling at the pace of thirty-five per week. Mine workers poured into the area as extensive mining operations such as the First Thought, Orient, Providence, and Easter Sunday mines produced wealth in the form of gold, silver, copper, cobalt, and nickel (Lakin 1987:151). Heavily capitalized mining operations involved transportation of boilers, compressors, hoists and other heavy equipment east across the Orient Bridge to the mines. In addition, horse- and mule-drawn wagons transported ore from the mines west across the bridge to nearby railheads and refining centers. Undoubtedly, this constant heavy traffic contributed to the structural problems that plagued the second Orient Bridge from the time of its construction in 1903 until its replacement with the present bridge in 1909.

Experience likely demonstrated that high volume commercial roadway traffic, hauling heavy live loads across the Orient Bridge, and the strong current of the Kettle River called for an exceptionally sturdy bridge at the Orient crossing. Although Parker truss bridges were typically more expensive to construct than conventional Pratt truss bridges, in considering bids for the

construction of the presently existing 1909 bridge, the county commissioners probably selected the stronger Parker truss as the best bridge type for the Kettle River crossing at Orient (Comp and Jackson 1977:n.p.).

On 21 May 1909, the Ferry County commissioners advertised for contract for two steel bridges across the Kettle River, one at Orient:

At a special meeting of the county commissioners Tuesday and Wednesday the following bids were read for the construction of two steel bridges across the Kettle River--one at Orient and the other at Godfrey.

International Contract Company	\$18,887
John F. Archer & Co.	14,394
Puget Sound Bridge Co.	13,900
The Charles G. Sheely Contracting Co.	13,780
Columbia Bridge Company	14,190

(*Republic News Miner* 21 May 1909:1)

The Board of Commissioners subsequently awarded the contract for construction of the Orient Bridge to the Charles G. Sheely Contracting Company of Denver, Colorado. During construction of the bridge, a plaque bearing the name of the contractor, the year of construction, and the names of the Stevens County Commissioners was affixed to the bridge's northeast inclined end post (see photograph WA-32-11).

Contract award for construction of the Orient Bridge to the Denver-based Charles G. Sheely Contracting Company reflected the nature of bridge building in the West between the 1880s and the early decades of the twentieth century. Typically, solicitation for bids in local newspapers produced responses from a select few national and regional bridge contractors and perhaps one or two local contractors. The Charles G. Sheely Company represented a contracting company of regional prominence. Charles Sheely formed the construction company that bore his name around the turn-of-the-century. In addition to bridge building, his contracting company specialized in road paving projects and commercial building construction in Colorado and elsewhere in the West. In bridge building, the Sheely Contracting Company, and other competing large contracting companies, purchased completed trusses directly from major steel foundries in Illinois and Pennsylvania, and transported the trusses to various bridge sites in the West (Colorado Department of Highways 1986:22-24). Undoubtedly, wholesale purchase of materials in volume directly from the manufacturer reduced costs for large contracting firms, an advantage local contractors did not possess.

In 1912, less than three years after construction of the present Orient Bridge, the First Thought Mine closed. Closure of the area's most active mine initiated the decline of the community of

Orient. The Great Depression of the 1920s and 1930s further exacerbated the economic decline of the town as one after another local business failed (Lakin 1987:186). During the 1930s, mining investors attempted to revive mining at Orient by reworking waste piles at the First Thought Mine. The waste ore was trucked from the mine across the Orient Bridge and shipped by rail to a smelter in Trail, British Columbia. At that time, gold brick was also transported from a mill near the mine to the city of Spokane in eastern Washington. Efforts to revive the First Thought Mine failed, however, mainly because chemicals needed to break down the old oxidized ore proved too costly. The project was abandoned in the late 1930s (Lakin 1987:186).

Closure of the First Thought Mine and other once active mines near Orient deprived the town of its principal employment base, an economic loss from which the town never recovered. However, the Orient Bridge still fills a vital place in the transportation network of northeastern Washington State, particularly in the movement of timber from forest reserves east of the bridge.

MITIGATION FOR PROPOSED DEMOLITION OR REMOVAL OF THE ORIENT BRIDGE

Because of the Orient Bridge's difficult and restricted eastern approach, and its limited load capacity, modern tractor-trailer motor vehicles can not use the bridge. The nearest alternate detour for tractor-trailer logging trucks involves an uphill detour to the Barstow Bridge located 3.5 miles to the south. This detour adds ca. one hour driving time to reach U.S. 395 when logging trucks are loaded, and ca. 35 minutes when they are empty (*Spokesman Review* 17 June 1971:A6). Ferry and Stevens counties are considering methods to alleviate the problem of restricted load capacity and deficient turn-around clearance at the bridge's east approach. The counties are considering four alternatives: 1) rehabilitation of the existing structure, 2a) construction of a new bridge upstream from (north of) the existing structure, 2b) construction of a new bridge downstream from (south of) the existing structure, and 3) construction of a new bridge at the existing site (Stevens County, "Orient Bridge Alternatives," map 1991).

Based on traffic flow and economic considerations, investigations conducted by Ferry and Stevens counties indicate that replacement of the existing bridge (alternative 3) with a new structure at the same location is the preferred alternative. Adoption of this alternative will result in the demolition or relocation of the present Orient Bridge. This photographic and narrative documentation of the engineering and historical significance of the bridge has been prepared as mitigation for proposed removal or demolition of the historic property.

BIBLIOGRAPHY

- Comp, T. Allan and Donald Jackson. "Bridge Truss Types: A Guide to Dating and Identifying," technical leaflet in *History News*, Vol. 32, No. 5, May 1977.
- Colorado Department of Highways. *Historic Bridges of Colorado*. Self published, 1986.
- Donaldson, Norman C., and Joseph T. DeFrancesco. *Soil Survey of Stevens County, Washington*. U.S. Department of Agriculture, Soil Conservation Service, 1982.
- Ferry County, Washington. *Town Plat Book, Ferry County, Book 1*. Ferry County Department of Public Works, Republic, Washington, various dates.
- Gies, Joseph. *Bridges and Men*. Garden City, New York: Doubleday and Company, 1963.
- Lakin, Ruth. *Kettle River Country: Early Days Along the Kettle River*. Colville, Washington: *Statesman-Examiner*, 1987.
- Herbst, Rebecca and Vicki Rottman, ed. *Historic Bridges of Colorado*. The Colorado Department of Highways, 1986.
- Republic News Miner*, 21 May 1909.
- Soderberg, Lisa. "Historic Bridges and Tunnels in Washington State." National Register of Historic Places nomination. On file in the Washington State Office of Archaeology and History, Olympia, Washington, 1980.
- Spokesman Review*, 17 June 1971.
- Statesman-Examiner* [Colville, Washington]. "Stevens County and Its Resources," 25 December 1899.
- Statesman-Index* (Colville, Washington). *Stevens County and Its Resources: The Statesman-Index Illustrated Special Edition*, 25 December 1899.
- Stevens County, Washington. Department of Public Works, Colville, Washington. Orient Bridge file. "Bridge Repair," September 1959.
- Stevens County, Washington. Department of Public Works, Colville, Washington. Orient Bridge File. "Bridge Repair," September 1965.

Stevens County, Washington. Department of Public Works, Colville, Washington. Orient Bridge file. "Cost of Painting Orient Bridge," no date.

Stevens County, Washington. Department of Public Works, Colville, Washington. Orient Bridge file. "Description of Project," n.d.

Stevens County, Washington. Department of Public Works, Colville, Washington. Orient Bridge File. "Orient Bridge Repair: Sheet 1, "Structural Report for the Orient Bridge," 1959.

Stevens County, Washington. Department of Public Works, Colville, Washington. Orient Bridge file. "Survey of County bridges on the Kettle River," 18 July 1963:n.p.